

Green Building

What is Green Building?

Builders and homeowners across the country are becoming increasingly interested in green building. A green home is one that has been built using environmentally sensitive construction techniques, generate less waste and/or uses less energy, water, and natural resources. The green building movement is synonymous with sustainable building practices, which advocate environmentally responsible construction as both a philosophy and a set of real-life applications. For example, sustainable recommendations might include swapping out light bulbs for compact fluorescents, investing in renewable energy sources like wind and solar power, and planting native trees and vegetation.

How is it applied?

For new construction, a design team might use recycled or local materials, which do not require transportation over long distances. Builders might choose wood from forests that have been certified for sustainable practices. The choice of building materials may include paints, carpets and adhesives that produce low levels of unsafe organic compounds. Carbon dioxide sensors may be installed to regulate fresh airflow.

Although most sustainable development is aimed at new buildings, increasingly people are becoming aware that the reuse and sustainable restoration of older buildings is the best green building technique of all. After all, “recycling” an old building conserves materials and energy, and eliminates the negative environmental, social, and economic consequences of demolition, which also translates into fewer trips to the landfill. When you preserve an existing building, you not only preserve the architectural pattern that contributes to neighborhood character, you preserve the materials and the energy that went into a building’s original construction. In addition to the new found focus on “carbon footprints,” there is increasing talk of “sustainable preservation.”

The US Green Building Council (USGBC) and the LEED program have been working on initiatives and guidelines for making new and older homes green. The USGBC publishes the Green Home Guide (www.greenhomeguide.org) which is an excellent resource for all homeowners and builders. This resource is updated often and provides a vast amount of information that will help you green your home and make for a healthier lifestyle in general. The Green Home Guide website identifies what makes a home green, provides guidance on green home programs, provides the Regreen Remodeling Guidelines, and discusses ways to live a green lifestyle with links to additional resources and a news and events page. The information below will help you identify what a green home is and also provide guidance on making your home green.

Location:



Vacant Lot in Northwest Roanoke

The selected location for a green building is as important as how it is built from a sustainability perspective. Green homes should never be built on environmentally sensitive lands (wetlands, prime farmland, etc.). Instead, green buildings should be located in compact development patterns (typically 6 units per acre or on approximately 5,000 to 7,000 square foot lots) that are suitable for pedestrian access to schools, shops, work, parks, and transit. Compact development preserves open space and reduces air emissions and pollution by supporting multiple modes of transportation.

Green Building Materials:

Green homes should be constructed or renovated with non-toxic building materials (not vinyl) and low- and zero- volatile organic compound (VOC) paints and sealants. Renewable wood-based products such as bamboo should be used for wood features throughout the interior of the home. The Forest Stewardship Council (<http://www.fscus.org/>) provides guidance on other renewable wood-based products. Salvaged materials are used where possible and may include doors, windows, sinks, cabinets and many other items that have been recycled from the community. The Habitat Store, affiliated with Habitat for Humanity, in downtown Roanoke provides recycled home construction supplies.



New Home in Roanoke with Cement Board Siding

When constructing a new home or renovating an existing home to be green, the disposal of waste should be done in an environmentally friendly way. Many of the items removed from an existing home can be recycled in ways that are better than taking them to the landfill. It is important to work with your builder to ensure that materials are disposed of in appropriate ways that allow them to be recycled or reused where appropriate. The Roanoke Valley Cool Cities Coalition (<http://www.rvccc.org/>) can provide further guidance and there are many resources available on the internet.

Insulation:

A well-insulated home provides for a comfortable indoor environment while keeping heating and cooling costs at a minimum. New exterior doors and windows should have Energy Star ratings and be properly sealed to limit heat gain in the summer and to reduce heat loss in the winter (for older windows and doors please see the Maintenance Section). Types of insulation vary widely (rolls, blown-in, foam, etc.) and your application should be non-toxic and provide for an appropriate R value. According to Energy Star, cost-effective insulation should have the following R values:

- For Ceilings: R-38 to R-49
- For Wood Frame Walls: R-11 to R-26
- For Floors: R-13 to R-25
- For Basement Walls: R-11 to R-19

Energy Efficiency and Renewable Energy:

Green homes consist of energy efficient lighting, heating, cooling, and water heating systems. All appliances should have Energy Star ratings.

Using renewable energy at your home is an increasing trend that is becoming more cost effective and easier to accomplish as the technologies develop. Renewable energy sources include solar, wind, geothermal, biomass, and so forth. The US Department of Energy- Office of Energy Efficiency and Renewable Energy offers the Solar Energy Technology Program (<http://www1.eere.energy.gov/solar/>) which provides detailed information on solar energies including photovoltaics and solar heating systems. Additionally, national retailers are capitalizing on this trend and are now providing solar power systems in their stores. For more information on photovoltaics and solar energy, use the link above as well as other research methods to find applications that are appropriate for your use. Local building supply stores will also be able to provide guidance.



Photovoltaic Panel

Photograph Courtesy of Oregon State University

Wind energy technology for residential use is not as technologically advanced as solar energy. However, capturing wind energy is an additional source of renewable energy that is increasing in popularity. Currently, the US Department of Energy- Office of Energy Efficiency and Renewable Energy provides the Wind and Hydropower Technologies Program (<http://www1.eere.energy.gov/windandhydro/>) for industrial uses. Scaled-down versions of these applications do exist for residential uses and are envisioned to be more readily available and cost effective as the technology advances. For information specific to Virginia on wind energy, visit James Madison University's Virginia Wind Energy Collaborative webpage (<http://vwec.cisat.jmu.edu/>).

Home Gardening/ Rainwater Collection/ Rain Gardens:

In addition to the renewable energy sources stated above, home gardening has become increasingly popular, especially with the rise in food prices. The US Department of Agriculture provides information on home gardening (<http://www.usda.gov>) with many useful links and resources that will assist you in your gardening projects. Additionally, the Virginia Cooperative Extension (<http://www.ext.vt.edu/>) offers educational programs and resources for various forms of gardening from large farms to home gardening of vegetables and fruits. Gardens may range in size based on your lot size, and may even be accomplished indoors with potted plants.



Vegetable Garden

Photograph Courtesy of City Dirt



Rain Barrels

Photograph Courtesy of This Old House



Rain Garden

Photograph Courtesy of Rice Creek Watershed District

Roanoke City's Special Tax Rate on Energy-Efficient Buildings

Rainwater collection and reuse is also an important green initiative that can be accomplished at your home. Rainwater collection systems vary widely and may be purchased or created following do-it-yourself manuals and guides. Rainwater collection may be used for non-potable household, landscape and agricultural use without placing burdens on the public water system. A typical rainwater collection system consists of a collection area (roof, etc.); a collection system (gutters, downspouts, piping, etc.) for getting the rainwater to the storage tank or cistern; and a water distribution system for accessing and distributing the water as needed. Abundant information on rainwater collection systems is available online through various web searches.

Rain gardens are also increasing in popularity and help to manage rainwater runoff for individual or groups of lots at a time without placing runoff into public stormwater collection systems. Many new residential and commercial development projects are including community rain gardens in their designs. Rain gardens need to be properly sited in a low-lying location in order to catch the rainwater runoff. Runoff typically comes from the roof of the home, driveway and other impervious surfaces found on the property. Runoff may need to be diverted into the rain garden through piping or other means if necessary. In order to function properly and absorb as much water as possible, the rain garden must consist of native or adaptive plant species that are deeply rooted and tolerate both wet and dry conditions. If properly installed, the rain gardens will not only beautify your home but also reduce and control rainwater runoff and provide ecological benefits to the area.

A special tax rate is available for energy-efficient residential buildings that exceed the energy efficient standards as prescribed by the Virginia Uniform Statewide Building Code by thirty (30) percent. The special tax rate applies to the building only and must be certified by a licensed design professional or contractor who is not related to the applicant. The exemption remains in effect for five (5) years. More information on the City's special tax rate on energy-efficient buildings can be found at www.roanokeva.gov/realestate.

Green Certifications

The following are three certifications that can be earned by practicing sustainable construction techniques. Most of these certifications are only available to licensed contractors but many of the underlying principles can be used to improve the efficiency of your own home.

LEED

The U.S. Green Building Council (USGBC) is a nonprofit organization that administers the Leadership in Energy and Environmental Design (LEED) program, a rating system that has become influential in recent years in shaping new construction, particularly commercial buildings. Known as LEED, the system was developed in 2000 to measure the effectiveness of sustainable design projects. Points are awarded in six categories, including



water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. Structures are certified if they meet basic requirements, while those that go above and beyond the minimum can receive silver, gold, or platinum ratings based on their scores. Although the Green Building Council does not have standards for historic buildings, in 2007 the USGBC launched a new rating system for houses, joining other groups such as the National Association of Home Builders, Energy Star, and EarthCraft ratings.

LEED for Homes promotes the construction and design of high-performance green homes that use less energy, water, and natural resources; creates less waste; and is healthier and more comfortable for the occupants. Benefits include lower energy and water bills, reduced greenhouse gas emissions, and less exposure to mold, mildew, and other indoor toxins. A LEED qualified builder must perform the work in order for your project to meet the requirements for a LEED certified home.

Websites: www.usgbc.com
www.usgbc.org
www.greenhomeguide.org

Energy Star



The Energy Star program is a joint effort between the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy to promote the use of energy efficient building practices and products. Energy Star is a voluntary program that sets performance guidelines that are intended to reduce greenhouse gas emissions from commercial buildings, manufacturing plants and residences.

To earn an Energy Star rating, a home must meet certain EPA guidelines for energy reduction and air pollution. The rating takes into account effective insulation, window efficiency, efficient duct systems, efficient heating and cooling equipment, and other household products. Energy Star also promotes a variety of energy-saving appliances, such as lighting fixtures, small fluorescent bulbs, ventilation fans, dishwashers, refrigerators, and washing machines. The program includes on-site tests and inspections conducted by third-party inspectors who award a blue Energy Star mark, which is a government-backed symbol that verifies a home is energy-efficient.

If a home qualifies as Energy Star efficient, homeowners then can opt for an Energy Star Indoor Package label, a new EPA specification that rates indoor air quality. Homes that receive this label include more than 60 additional features that control moisture, chemical exposure, ventilation, and filtration. Here are a few ways to incorporate the Energy Star program into your own home:

- If you are looking for new household products, look for ones that have earned the ENERGY STAR rating. These items meet strict energy efficiency guidelines set by the EPA and US Department of Energy.
- If you are looking to make larger home improvements, EPA offers tools and resources to help you plan and undertake projects that will reduce your energy bills and improve the comfort of your home.
- If you are looking to buy or build a new home, look for one that has earned the ENERGY STAR rating or discuss the opportunity with your builder.

Website: www.energystar.com

EarthCraft



The EarthCraft House program is a voluntary agreement that seeks to reduce pollution and conserve natural resources. The EarthCraft program was created in 1999 by the Greater Atlanta Homebuilders Association. It seeks to promote green building practices for new construction and renovation. For new home construction, EarthCraft homes must meet Energy Star certification criteria. EarthCraft house guidelines include categories such as site planning, the use of energy-efficient design and building materials, waste management, indoor air quality, and water conservation. Any home that has been EarthCraft certified has also received an Energy Star certification. Builders who exceed the standard criteria can receive a select or platinum status certificate.

The EarthCraft House Renovation program deals with existing homes, as well as expansions and additions. Similar to the EarthCraft new homes program, contractors who participate in the renovation program must attend classroom training. Before work commences, an EarthCraft inspector will assess a home and write a series of recommendations that homeowners can choose from. A house can then be certified as an EarthCraft project when the added green features score enough points on an EarthCraft House scoring worksheet.

Following the model set in Atlanta, the EarthCraft House program became a statewide program in Virginia in 2005. To receive an EarthCraft rating for a new home or renovation project, a builder who is familiar with EarthCraft must be used. More information on the EarthCraft House program in Virginia can be found at:

Website: www.ecvirginia.org

20 Ways to 'Green' Your Home and Life



Fluorescent Light Bulb
 Photograph Courtesy of MamasHealth.com



Fireplace Draft Stoppers
 Photograph Courtesy of Battic Door Home Energy Conservation Products



Roanoke City Market
 Photograph Courtesy of Downtown Roanoke Inc.

1. Switch to compact fluorescent light bulbs (CFLs). By replacing some or all of the incandescent light bulbs in your home, heat production and energy use can be reduced.
2. Program your thermostat. Programmable thermostats allow you to program heating and cooling systems to reduce output at times when no one is home, or during evening hours when people are likely to be sleeping. The thermostat should be kept at 78° F or higher during the summer, and at 62° F or lower in the winter. Or, open the windows and turn on a fan. Most older homes were designed with good cross-ventilation; so take advantage of your home's layout.
3. Plug air leaks. Leaks commonly occur around windows, doors and other wall openings. Leaks can be plugged easily with weather stripping or caulking.
4. Keep original windows intact. Studies show that older windows can perform as well as replacements. Weatherstrip them so that they seal tightly, caulk the exterior trim, and repair cracked **glazing** or putty around glass. You'll reduce landfill waste and the demand for new materials. Remember, vinyl is not a green building material. It is a nonbiodegradable material that gives off toxic byproducts when it's made.
5. Insulate the attic, basement and crawl space. About 20 percent of energy costs come from heat loss in those areas.
6. Install fireplace draft stoppers, attic door covers, and dryer vent seals that open only when your dryer is in use. An open dampener in a fireplace can increase energy costs by 30 percent, and attic doors and dryer vent ducts are notorious energy sieves.
7. Tune up heating and cooling (HVAC) systems. Your HVAC system should be checked every two years to ensure efficiency. The filter should be cleaned monthly during peak usage.
8. Choose Energy Star appliances. When considering the price of a new appliance, take into account the purchase price, as well as the long-term savings associated with an energy-efficient appliance. Energy Star-rated products have been tested for a higher level of energy efficiency than average appliances.
9. Buy local. Buying local products reduces the amount of fossil fuels required for transportation of food from other locations. It also reduces the quantity of plastic and paper products consumed in packaging of products brought in from other areas.



Sink Aerators
 Photograph Courtesy of Water-Smart



Compost Pile



10. Use low-VOC products. Indoor air quality can be achieved by switching to products that don't give off "volatile organic compounds." Common low or no-VOC products include low-VOC paint and low-VOC cleaning products.
11. Use wood alternatives or FSC-certified wood products. Consider using environmentally sensitive and renewable products such as linoleum, bamboo, recycled-content tile or non-VOC carpet. Choose wood products from sustainably managed forests, such as those certified by the Forest Stewardship Council.
12. Choose rapidly renewable flooring materials. Flooring options include those made from grasses and trees that mature in roughly half the time it takes hardwood trees to reach market size. Bamboo, cork, and eucalyptus flooring products are a sustainable alternative to traditional hardwoods.
13. Reduce Water Use. Use less water indoors by adding aerators to sink faucets, and by changing to low-flow showerheads. Outdoors, incorporate native vegetation to landscape plans, add a rain barrel for plant irrigation; minimize high-maintenance landscaping such as turf grass, a step that will conserve water.
14. Use native plantings. Since native plants have been growing and evolving for many years, they have adapted to local soils and climate. Thus they are more likely to require less care than exotic plants, which cuts down on the need for water, fertilizer and pesticides.
15. Plant a rain garden in a low lying area to slow runoff from downspouts and driveways. Deep rooted plants that like water, but can sustain a drought, should be used.
16. Compost food scraps, grass, dead plants, and other yard clippings.
17. Plant trees to provide shade and wind protection, which can save energy on heating and air-conditioning.
18. Use nontoxic gardening techniques. Avoid the over-application of pesticides, which have a negative impact on air and drinking water.
19. Carpool, use public transportation, walk or bike when possible. Green transportation can reduce energy expenditures and carbon emissions from your daily routine. One advantage to buying or building a home in a Downtown or Traditional neighborhood is that all of these options are usually available.
20. Save paper by using the electronic version of the *Residential Pattern Book for the City of Roanoke*.